

(6) C. A. B. asks how an egg (common hen's egg) can be put in a bottle, whose neck is smaller than the egg, and have the egg in perfect shape in the bottle. A. Soften the shell with acetic acid. It may subsequently be hardened by means of lime water.

(7) M. S. asks how the crystals on tin plate are got. I can bring out crystals with acid in the common way, or I can fuse the tin and cool by washing cold water on it, then applying the acid. The first brings out a large coarse crystal, the second a small square star shape pattern. What I wish is different; it is called acid crystals, to distinguish from the other water crystals. It comes out equally brilliant on each side, as if the whole sheet was dipped in acid. Have tried nitric, muriatic, and sulphuric acids, both with salt and sal ammoniac, but without the required effect. A. Dip the warm plate in nitro-muriatic acid diluted with 2 volumes of soft water just long enough to develop the larger figures; then immediately plunge into a large quantity of cold water, after which dip in boiling water, which on removal will cause the plate to dry spontaneously. Lacquer immediately. A similar result is obtained by exposing the plate as it comes from the tin bath, and while the metal is still in a semi-fused condition, to jets of cold air for a few moments.

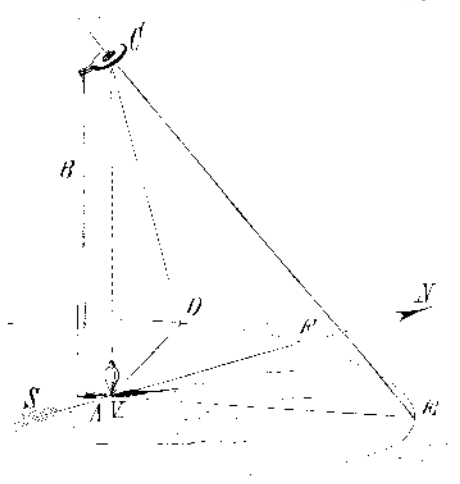
(8) C. A. R. writes: I am putting up electric bells in my house, and the ideas I wish to obtain are these: 1. What kind of battery shall I use in preference to any other? I mean, of course, among the constant condensing. A. The gravity. 2. Which battery would give the strongest current: 3 Leclanche cells, 1 1/2 pints, 2 1/2 size, or 2 Callaud, such as are used in the telegraph offices; and which one of the two would last the longest? A. The Leclanche cells. 3. Will 3 cells of the first battery, or two of the last, be sufficient to work the bells? The wire I have is about No. 24, and the longest stretch from battery to push button and back is about twice 40 or 50 feet. A. Yes, but No. 18 wire would be rather better. 4. What number of wire is generally used for the magnet of house bells, and that of the connections from battery to button? A. Nos. 18 to 24. 5. Can Leclanche cells, I mean the porous cups, be refilled so as to possess the same power as when new? A. Yes. 6. If so, what is the best way to clean them? A. Soak them in warm water. 7. Must the oxide of manganese be pure, or is it better impure? Should it be powdered fine or coarse (like cracked corn)? A. It should be pure and granulated, or coarsely powdered. 8. Are the zinc rods better when amalgamated or not? Must they have a smooth or rough surface? A. They are more easily cleaned if smooth. They should be amalgamated. 9. Can you give me an idea of how I can make myself a small indicator of about 6 numbers? A. Cover each number with a small hinged cover arranged to drop by its own gravity. Hold this cover in place by a small catch. Attach to the catch an armature, and above the armature place an electro-magnet capable of raising the catch and the armature. Connect the wires of the magnet with the circuit, closing the device in the door or window, to be indicated.

(9) W. L. W. writes: There are several bored salt wells in this section, sunk for drinking water, but cannot be used on account of the salt. One well yields a teacupful of salt to the gallon of water boiled down, say 1 lb. to the gallon. We wish to know if it will pay for the manufacture of salt. It is believed the water supply is inexhaustible at the depth of borings of 110 feet. A. The amount of salt would not permit of profitable working.

(10) F. X. W. asks: What substances can I use to make a paste or cement capable of withstanding boiling water, and at the same time soft, elastic, and pliable, used on felt and textiles, etc? A. Try a solution of gum caoutchouc in bisulphide of carbon. Dry under strong pressure.

(11) J. H. C. asks for the best way to test potato starch in regard to its quality. A. Microscopic examination is the best and quickest test, the size, shape, and markings of the granules of different kinds of starch rendering their recognition quite easy, as well as distinguishing the starch from foreign matters. See Wagner's "Chemical Technology."

(12) D. H. S. writes: My watch having stopped on the 16th day of Nov., and no other timepiece being at hand, I obtained time by the following process:



In the evening a board having a straight edge was leaned against the cabin and aimed at the north star. A plumb line was then suspended from the edge of the board. From the almanac I learned that upon the 17th the sun would fall on noon mark 11:45. The instant the shadow of edge of board coincided with plumb line I set my watch at the time mentioned, 11:45. My companions said the time was too slow, and so it seemed to me. Can the true mean time be obtained in the manner described above, and if not, what corrections are necessary? A. Your failure to get a true meridian line was owing to the fact that the pole star is only on the meridian twice in 24 hours, and these times change from day to day, by reason of the difference of sidereal time given by the apparent diurnal motion of the stars and solar time given by the appar-

ent daily motion of the sun. The pole star is twice daily at its extreme eastern and western elongations, 1 1/2 degrees from the true north. He could have obtained his meridian line and by it have set his watch as follows: Set up a stick, A B, and on its end fasten a piece of tin perforated with a hole. Let the string of a plumb bob hang through the center of this hole, and thus get a point in the vertical, marked V in the diagram. About 9 A.M. mark the center of the image of the hole at D, then with the line, A D, as a radius, describe an arc of a circle, and when in the afternoon the image of the hole falls on this line, as at E mark, then the line, N S, which bisects the angle, D A E, is the true meridian.

(13) W. M. asks what the ingredients are used by Cooper and several other glue manufacturers to make common glue white. A. Use fine, clear stock, a little alum, steam heat, and vacuum boilers.

(14) W. C. writes: 1. The recipe for violet copying ink which you give in your SUPPLEMENT, No. 157, p. 2498, is not intelligible. Please inform me what the symbols 5B, BR, etc., mean. A. The terms are those used by dealers to designate particular shades of color. 2. Please inform me whether you have published a recipe for making the copying pad which is so much used. A. See p. 335, SCIENTIFIC AMERICAN, Vol. 41.

(15) G. H. J. asks: What solution of silver is precipitated in a granular metallic form, by immersing in it a plate of copper? A. Sulphate or nitrate.

(16) H. H. asks for a good receipt for dressing for shoes, such as is sold in bottles under title of "French dressing" for ladies' or misses' shoes. A. Logwood extract, 6 oz., dissolve in soft water 1 gallon; borax, 6 oz., dissolve in soft water 1 gallon, and add 1 1/2 oz. shellac, boil to dissolve; bichromate of potash 3/4 oz., dissolve in soft water 1/2 pint, and add 3 oz. ammonia water. Mix all together.

(17) W. B. P. asks: What material can I fortify with, in making a copper plate stencil, by allowing nitric acid to "eat out" the letters? A. The etching ground commonly used is prepared by melting together equal parts of asphaltum, Burgundy pitch, and beeswax, stir to incorporate. If the ground is brittle, use more beeswax; if it drags, more asphaltum.

(18) D. C. M.—Consult Blodgett's "Climatology," Buchan's "Handbook of Meteorology," Dove's "Law of Storms," Espy's "Philosophy of Storms," Herschel's "Meteorology," Karentz's "Meteorology," Larner's "Meteorology," Morris' "Meteorology," Jenkens' "Use of Barometers," etc.

(19) B. S. writes: I made a copying pad according to directions in your paper, and find it works well, except that the material wastes away very rapidly in the cleaning after use. How could I obviate this difficulty? A. Use a very little warm water instead of cold. The gradual wasting is unavoidable.

(20) J. C. L. asks: How shall I proceed to polish copalite to properly show the insects therein? A. Cut it with a fine saw, and polish with tripoli and a little oil, applied on kid or chamois skin.

(21) R. W. H. asks for a receipt for dyeing billiard balls? A. Black.—Boil in a strong aqueous solution of logwood extract, and then immerse in acetate of iron solution; repeat if necessary. Blue.—Immerse for some time in a dilute aqueous solution of sulphate of indigo partially saturated with potash. Green.—Dip the blue ivory in tin liquor for a few minutes, then in a hot saturated aqueous solution of fustic; or boil the iron in a solution of verdigris in vinegar. Yellow.—Use the tin mordant and a hot strained decoction of fustic. Red.—Use tin mordant, and steep in a decoction of Brazil wood or cochineal or both. Lac, under similar circumstances, produces scarlet.

(22) S. G. writes: 1. I am about making an engine to run a scroll saw. It requires about the same power to run the saw as a sewing machine. What would be the proper dimensions for the engine? A. About as small as you can make, say 1 inch cylinder by 2 or 3 inch stroke. 2. Would Babbitt metal be hard enough to make the cylinder? If not, is there any metal softer than iron that would do? A. Yes, but it would wear fast. Use a piece of mandrel drawn brass tubing.

(23) G. A. C. asks: 1. If a steam fire engine will throw a stream a distance of 100 feet through 100 feet of hose, the engine running at 150 revolutions a minute, will it throw as far through 1,000 feet of hose, the engine still making 150 revolutions per minute? A. Yes, but it will require much more engine power to overcome the friction of the water in the 900 additional feet of hose. 2. Please name a good work on the steam engine for one who is not a professional engineer. A. Bowne's "Catechism of the Steam Engine."

(24) W. H. asks: What is the best self-feeder for low pressure steam boiler (up to 10 lb.)? A. The old Watt water column and float.

(25) P. V. H. writes: I think that the trouble complained of by your correspondent W. H., 6 query, page 123, in your number of February 2 (received to-day), will be corrected, if he brings his return pipe for condensed water from radiators into the boiler below the level of the water. The noises made are due to the struggles between the steam and water, when this pipe is open sometimes to steam, making varying pressure as the quantity of condensed water varies. Having suffered myself from this trouble, I completely corrected it in this way. There is never the least noise now.

(26) S. G. M. asks: 1. Can you give me a description of the Blake transmitter? A. See p. 274, Vol. 40, SCIENTIFIC AMERICAN. 2. Will the Lyons transmitter (described in SUPPLEMENT No. 163) work without an induction coil? A. No.

(27) R. H. J. writes: I have a new steam kettle, cast iron, porcelain lined, which is supplied with steam by a 1/2 inch pipe; it is 10 feet from the boiler, and yet I can scarcely make water boil in it with 30 lb. of steam; what is the matter? A. You send insufficient data, but a few general remarks may throw some light on the trouble. To raise water from mean temperature (39° Fah) to boiling, it requires about one fifth its weight

in steam to do it, making no allowance for loss of heat by radiation. To evaporate all the water from a steam kettle it will require at least its own (the water's) weight of steam. The waste or return water from a steam kettle should not be taken to the same steam trap as the water from the heating apparatus, for the great shrinkage, that is, rapid condensation, due to the steam coming in contact with a large body of water through the sides of the kettle, will cause the condensed water to back up and fill the steam space. Theoretically it will take about 2 1/2 minutes to boil a cubic foot of water, assuming all the steam that can pass through a 1/2 inch pipe at 30 lb pressure can be utilized in the same time. Thus, if you have a 75 gallon kettle it will take 25 minutes to heat all the water to 212° Fah. with steam through a 1/2 inch pipe, making no allowance for transmission through the iron, the slowness of convection of the water, and loss by radiation, and this under the most favorable circumstances of piping and trapping. When ebullition begins all the water in a kettle has not yet reached 212°. The baking of about 1/2 of an inch of mush on the bottom of a kettle, for the want of stirring when the meal was first put in, prevented the proper cooking of the food for 10 hours, and eventually it had to be removed to another and clean kettle.

(28) R. D. G. asks: 1. Do you know of any gear cutters which can be attached to a lathe? A. There are gear cutters made to be attached to a lathe for cutting small wheels. 2. I would like to know the easiest method for getting the diameter of a wheel when the pitch and number of cogs are given. A. Multiply the pitch by the number of teeth; the product is the circumference of the wheel at the pitch line.

(29) H. H. & Co., referring to our reply to F. A. S. on p. 124, current volume of SCIENTIFIC AMERICAN, write: The Bessemer steel from which railway rails are made contains from 35 to 45-100 of one per cent of carbon, and if mould boards and scraper bottoms are made of such steel, they can be hardened. These articles are made every day by all steel works from such material when asked for. Of course the degree of hardness will not be equal to the special plow steels made by the crucible method. Sheet steel for shovels, spring steel for carriage springs, etc., are rolled from Bessemer ingots when buyers require a cheap article.

(30) J. R. asks for a work on steam fitting similar to Mr. Baldwin's "Hints to a young Steam Fitter." A. We do not know of a work exclusively devoted to the subject. 2. What is the best length for a tubular boiler to burn hard coal, 12 or 14 feet; and the best size tube, 3 1/2 or 4 inch; draught is good. A. If you use 3 1/2 inch tubes you can make the boiler 12 feet, but with 4 inch tubes it should not be less than 14 feet. In either case it may be made 2 feet longer with advantage.

(31) R. C. M. asks (1) for a rule for finding the horse power of engines. A. Square the diameter of the cylinder, multiply the product by 0.7854. Multiply this product by the average pressure of steam per square inch on the piston, and this result by the number of feet the piston travels per minute, and divide by 33,000, the quotient is the horse power. 2. What is the rule for finding the horse power of a tubular boiler? A. For a tubular boiler allow 15 to 17 feet heating surface for each horse power. 3. What is the name of the newest and best book on the blast furnace? A. Schinz on "The Action of the Blast Furnace."

(32) J. L. writes: 1. In your issue of February 7, 1880, question No. 1. you advise hydraulic cement properly mixed to stop leaks in legs of locomotive boiler corroded by salt or lye. How is it to be mixed? Are you not advising the party to get up a first class explosion; one that will make that boiler throw a somersault similar to a locomotive boiler which exploded inside of Rogers' Works in Paterson, N. J., in 1852? A. Mixed like ordinary hydraulic lime mortar, small pieces of broken bricks put on to fill up space, there is no danger if the top is kept properly below the fire line. It has been used successfully in a number of cases. 2. What do you consider the best packing or joint for use between cast iron steam dome and top of portable boiler? A rust joint or soft cement composed of lead, oil, and borings, as per "Wrinkles and Recipes," pages 135 and 136? A. If the surfaces are true and faced, use the soft cement; if rough and untrue, make a rust joint.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

E. F. B.—It is pyrolusite—binoxide of manganese. The powdered mineral is commercially known as manganese, also as black oxide of manganese. It is largely used in the manufacture of bleaching powder or chloride of lime (calcium hypochlorite) and in glass making.—S. D.—We cannot judge fairly of the value of your water from so small a sample. The cost of a full quantitative analysis of a mineral water would be about \$100.—M. M.—The ore is undoubtedly rich in silver; it is free milling.—J. F. S.—The sample of boiler incrustation consists chiefly of sulphate and carbonate of lime, oxide of iron, silica, alumina, and organic (carbonaceous) matter. The use of small quantities of tannate of soda has been found efficacious in preventing the formation of hard incrustations. Filter the water and use the blowout frequently.—W. S. B.—Crystals of rose and amethystine quartz, sometime used in jewelry. They are of little value. No. 2. It is chlorite in quartz, possibly auriferous.—L. M. C.—They consist chiefly of carbonate of lime with small quantities of clay, quartz, sulphide of iron, and lime phosphate.

English Patents Issued to Americans.

From February 13 to February 17, inclusive. Anæsthetic compound, T. A. Edison, Menlo Park, N. J. Bookstand, F. G. Johnson, Brooklyn, N. Y. Dyeing, G. G. Smith, St. Albans, Vt. Electric lamp, T. A. Edison, Menlo Park, N. J. Electric light, T. A. Edison, Menlo Park, N. J. Flue cleaner, R. Atherton et al., Paterson, N. J. Gas, manufacture of, H. Y. Attrill et al., New York city. Oil still, E. Watson, Buffalo, N. Y. Printing calico, F. Baylies et al., New York city. Railroad rails, A. J. Gustin, Boston, Mass. Refrigerating apparatus, S. B. Hunt et al., N. Y. city. Telegraph, electric, B. Thompson et al., Toledo, Ohio. Wood-cutting tool, F. Hanson, Hollis, Me.

INDEX OF INVENTIONS FOR WHICH Letters Patent of the United States were Granted in the Week Ending February 17, 1880, AND EACH BEARING THAT DATE. [Those marked (r) are reissued patents.]

Table listing various inventions and their patent numbers, including items like Aerial navigation, vessel and machinery for, A. L. Blackman, Axle box, car, T. V. Le Roy (r), Axle box, car, I. P. Wendell, Bale tie buckle, J. H. Mitchell, Baling press, M. F. Connett, Banjo, C. F. Burrows, Barber's chair, F. Peters, Barrel machine, G. Farnsworth, Barrels, handling, J. A. Griswold, Barrels, lye conductor for, F. Jones, Bed lounge, T. Soden, Beadstead fastening, O. G. Musser, Beehive, J. T. Fife, Belt, galvanic, C. Norwood, Bluing package, H. Sawyer, Boat knee, Cory, E. G. Matthews (r), Boiler furnace grate, C. Hill, Bolt mechanism for locking ranges of cells, G. F. Kindt, Book copying, S. Hand, Boot and shoe tree, J. A. Ambler, Boot and shoe uppers, lasting, G. W. Copeland et al., Boot tree, A. W. Cox, Bottle box, J. Matthews (r), Bottle, nursing, J. E. Potter, Box fastener, J. Casey, Box smoothing iron, J. M. Lemasney, Bracelets, manufacture of, E. W. Webber, Bricks and tiles, machine for cutting off, J. S. Smith, Bridge, truss, R. W. Gerrill, Bridge bit attachment, N. J. Blatherwick, Buckle, harness, I. L. Landis (r), Bulletin board, L. O. Harris, Buttons to sale cars, machine for attaching, F. W. Clough, Can nozzle, G. Browne, Cane cutter, sugar, P. Seitz, Cane shaving machines, attachment for, G. S. Colburn, Cannon, breech-loading, Brannon & Bunting, Cant hook, H. C. A., & J. H. Peavey, Car coupling, J. H. Meredith, Car coupling, A. S. Peck, Car coupling, H. N. Wickes, Car for common roads, T. T. Prosser, Car, freight, T. T. Prosser, Car, stock, J. L. Copp, Car, stack, S. H. McGibeny, Cars, illumination of railway, R. Becklen, Carbureting apparatus, Heywood & Roeklen, Carriage prop block washer, A. W. Parker, Carriage spring, J. R. Locke, Cart, grain, T. T. Prosser, Caster, B. F. Culver, Chain, drive, J. Simpson, Chains, manufacture of, A. O. David, Christmas tree holder, H. Albrecht, Churn power, Z. T. Parker, Clocks and watches, second hand attachment for, A. Bonzon, Cloth folding and cutting machine, G. W. Baker, Cloth pressing machine, E. Gessner (r), Clothes line fastener, J. T. Cronk, Clothes pounder, J. W. Tullis, Coal, etc., composition for aiding the ignition of, J. M. Child, Collar, horse, Fisher & Watson, Cooking apparatus, steam, E. Fox, Corn dropper, rotary, J. Selby, Corn husker, W. B. Farwell, Corn sheller, W. S. Reeder, Cornice, adjustable window, S. R. Scottron, Cotton chopper, J. B. Carson, Crane for loading vessels, J. W. Alexander, Creasing and embossing tool, comb'd, R. Young, Cultivator, A. H. Allison (r), Cultivator, D. Gupta (r), Damper regulator, automatic, F. A. Jones, Deflection stand, Jackson & Guerber, Dental mouth glasses, support for, R. B. Donaldson, Dental plugger, H. D. Justi, Disinfecting apparatus for water closets, etc., E. J. Mallett, Jr., Door spring, M. R. Davis, Door spring, T. Rowe, Drill hole cleaner, pneumatic, J. I. Prentiss, Drop handle, J. Kintz, Electric apparatus, dynamo, C. F. Brush, Electric conductor, C. E. Chinnock, Electric lights, apparatus for treating carbon pencils for, W. Sawyer, Electric machine, dynamo, W. Hochhausen, Electrical conductors, induced current guard for, C. E. Chinnock, Elevator, Bevins & Phillips, Elevator, G. H. Pleasance, End gate, wagon, G. Jontz, Extinguisher, W. H. Hovey, Fabric stripping machine, J. Craig, Faucet, drain, A. G. Glass, Feather notching machine, A. Wemple, Felly bending machine, C. Wright, Fence, W. B. White, Fence post driver, J. Carpenter, Filter, I. T. Green, Firearm, magazine, W. H. Elliot, Firearm, revolving, A. Swingle, Firearm sight, R. F. Cook, Fire engine, steam, H. F. Shaw, Fire extinguisher, A. M. Granger, Fluids, apparatus for effecting interchange of temperatures of, S. H. Rouart, Flush bolt, P. Bradford, Fruit gatherer, S. Rice, Furnace fire door, Babcock & Wilcox, Garbage receptacle, V. Borst.

